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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/696,462	10/29/2003	Jenc A. Golovchenko	HVD2093	5987
26247	7590	05/25/2007		
THERESA A LOBER T.A. LOBER PATENT SERVICES 45 WALDEN ST CONCORD, MA 01742			EXAMINER GUHARAY, KARABI	
			ART UNIT	PAPER NUMBER
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/696,462	<b>Applicant(s)</b> GOLOVCHENKO ET AL.	
	<b>Examiner</b> Karabi Guharay	<b>Art Unit</b> 2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on RCE, filed on 8/30/07.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-6, 8-12, 15 and 31-41 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-6, 8-12, 15, 31-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

***Continued Examination Under 37 CFR 1.114***

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 8/30/07 has been entered.

***Response to Amendment***

Amendment, filed on 3/01/07 has been considered and entered.

Claims 1, 9, 31-32 are amended. New claims 34-41 are added.

Currently, claims 1-6, 8-12, 15, 31-41 are pending.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-2, 6, 8-9, 11, 15, 32, 34-40 are rejected under 35 U.S.C. 102(e) as being anticipated by Hunt et al. (US 2002/0167374).

Regarding claims 1, 8, 32, 34 & 37, Hunt discloses a carbon nanotube device (see Fig 1) comprising a substrate (support 14, 16 made of silicon wafer or alumina or

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sapphire, paragraph 47) including an aperture (22) extending from the front and back surface of the substrate; at least one pair of electrically conductive pads (18, 20) disposed on the front surface of the substrate, while the conducting contact-pad in a given pair being separated from each other by the aperture, a carbon nanotube catalyst region (17 of Fig 1) or see Fig 5D) disposed on top a contact pad 18 in alignment with an edge of the aperture (best shown in Fig 5D, where catalyst layer is formed on both sides of the aperture with edges aligned with the aperture and exposed at the selected substrate surface (paragraph 56); and at least one carbon nanotube (24) extending across the aperture and accessible through the aperture from both sides of the substrate (support 12, 14) each of the CNT (24) contacting exposed catalyst region on a contact pad at the selected substrate surface.

Regarding claim 2, Hunt discloses carbon nanotube comprises a single walled carbon nanotube (Paragraphs 12 & 47).

Regarding claim 6, Hunt discloses plurality of carbon nanotubes (Figs 11-12).

Regarding claims 9,11 & 38, Hunt discloses that the substrate (support) comprises a membrane made of silicon dioxide having an aperture there-through (see SiO<sub>2</sub> layer in Fig 5D) and on a top surface of which is disposed contact pad and catalytic region of the nano-wire (though contact pad is not shown in Fig 5D it follows the structure of Fig 1).

Regarding claim 15, Hunt discloses plurality of conducting pads connecting plurality of nano-tubes (Fig 11-12).

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Regarding claims 35-36, Hunt discloses that the contact pads (18, 20) make electrical connection to a device (27) provided on the selected substrate surface (paragraph 41).

Regarding claim 39, Hunt discloses that the contact pad comprises platinum (paragraph 60).

Regarding claim 40, Hunt discloses that the catalyst regions comprises a material selected from the group consisting of Fe, Co and Ni (paragraph 56).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 10, 31, 33 & 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunt et al. as applied to claim 1.

Regarding claim 10, Hunt discloses all the limitations of claim 11, except for the membrane being made of silicon nitride, instead Hunt discloses silicon oxide membrane.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use silicon nitride instead of silicon oxide since these are well known equivalent for use of support member.

Regarding claims 31, 33 & 41, Hunt et al. disclose all the limitations of claims 31, 33 & 41 including a small portion of the contact pad is covered by the catalytic region

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about sub 50nm thickness, except for a region of the catalytic region covering the contact pad being less than about 2 mm or no greater than  $17 \times 10^{15}$  atoms per square centimeter or covering the entire contact pad.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to optimize to have above coverage of contact pad by the catalytic region since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. ***MPEP 2144.05 II A***

Claims 3-5, are rejected under 35 U.S.C. 103(a) as being unpatentable over Hunt et al. as applied to claim 1 above, and further in view of Brown et al. (US 6297063)

Regarding claims 3-5, Hunt discloses all the limitations of claims 3-5 except for carbon nanotube being multi-walled and comprises a metallic or semi-conducting carbon nanotube.

However, Brown et al. in the same field of growing suspended or cantilevered nanotubes (figs 6B-6C) discloses that such nanowire connections are suitable for both single wall or multi-wall carbon nanotube (lines 25-28 of column 6) and further teaches metallic carbon nanotube and semiconducting nanotube (lines 28-33 of column 5).

Thus it would have been obvious to one having ordinary skill in the art at the time the invention was made to use either SWNT or MWNT and semiconducting or metallic CNT in the device of Hunt et al. since MWNT or SWNT and semi-conducting or metallic CNT are suitable for nanowire connections.

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Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hunt et al (US 20020167374) further in view of Bradley et al (US 20040043527).

Hunt teaches all the limitations set forth, as described above, except the support structure is aligned between a source of electrons and an electron detector for transmission electron microscopy of the carbon nanotube. In the same field of endeavor, Bradley et al ('527) teaches a carbon nanotube device comprising a support structure holding a nanotube (230; paragraphs 55-56) is aligned between a source of electrons (150, 240) and an electron detector (260) for transmission electron microscopy of the carbon nanotube in order to decrease the electrical resistance of the measuring device (paragraph 44). Hence, it would have been obvious at the time of the invention to one of ordinary skill in the art to modify the nanotube structure of Brown et al ('063) to incorporate the measuring device of Bradley et al ('527). Motivation to combine would be to improve the measuring device's accuracy.

### ***Response to Arguments***

The arguments about Brown reference are moot in the light of new grounds of rejection. Only relevant argument regarding Hunt reference is that the description of Fig 11, where applicant contends that substrate 12 is still present.

Examiner respectfully presents that support structure of the Hunt reference is considered as the claimed substrate in this case.

Hunt may have other substrate also but as far as claim limitations are concerned support is considered as substrate.

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Since claim language includes the open ended phrase "comprising" there could be other structural elements present in the structure, in this case another substrate 12.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karabi Guharay whose telephone number is 571-272-2452. The examiner can normally be reached on Monday-Friday 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimeshkumar D. Patel can be reached on 571-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*KGuharay*  
Karabi Guharay  
Primary Examiner  
Art Unit 2879  
*5/22/07*